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Exploring Smell Loss Patterns and Recovery Factors Among Covid-19 Patients in Benghazi, Libya

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ABSTRACT

Objective: The main objective of this research is to investigate the recovery patterns and the demographic factors that affect patients with loss of smell post-COVID-19 disease in Benghazi, Libya. Besides, to examine whether the patient's responses statistically differ according to several variables, including severity of smell loss, gender, and age.

Method: This research adopts a cross-sectional design to capture a snapshot of patient experiences during the COVID-19 pandemic in Benghazi. A structured questionnaire is used for data collection. The research collects 96 valid questionnaires over the period from November 2023 to February 2024 from (1) the Speciality Surgical Center; and (2) the Al-Rowad Specialised Center. Then, the research employed descriptive analysis, the One-sample Wilcoxon Signed rank, the Spearman correlation test, and the Independent Samples Kruskal-Wallis test.

Results:16 (17%) participants suffered from a mild loss of smell, 30 (31%) participants suffered a moderate loss of smell, and 50 (52%) participants suffered a severe loss of smell. Only 26 (27%) participants reported that it was gradual onset while 70 (73%) reported the opposite. Regarding the recovery pattern, 54 (56%) participants had complete recovery of loss of smell, while 18 (19%) had partial recovery, and 24 (25%) had no recovery, where 46 out of 54 participants completely recovered in the first month, and only 8 participants recovered after 60 days. There is a weakly significant relationship between the smell loss severity and recovery period. Also, there are no statistically significant differences between groups of varying smell loss severity (mild, moderate, or severe) in different genders, smell recovery periods, or age (all p-values > 0.05).

Conclusion: It can be concluded that, although the infection with COVID-19 among the participants was generally of moderate severity, the condition of the loss of the olfactory sense was severe and occurred suddenly, but at the same time, the largest percentage of participants recovered completely from it within the first two weeks of infection. However, it cannot be relied on smell loss as an early indicator of COVID-19 infection.

KEYWORDS: COVID-19, Recovery patterns, Recovery Period, Smell loss.

1. INTRODUCTION

The COVID-19 pandemic, which is attributed to the SARS-CoV-2 virus, has presented a wide range of clinical manifestations. These include fever, cough, mild to severe respiratory symptoms, and, a significant incidence of smell loss(anosmia)[1]. Beyond just respiratory discomfort, the prevalence of anosmia, hyposmia, or other olfactory abnormalities in COVID-19 patients has been extensively observed in a variety of geographical areas[2]. Recent international investigations have highlighted the strong link between COVID-19 disease and smell loss. Anosmia was reported to be a presenting symptom in 73.6% of patients diagnosed with COVID-19 disease in an early study published in JAMA Otolaryngology-Head & Neck Surgery[1]. There is a need to look into smell loss as this startling number highlights a major COVID-19 indicator.

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The role of smell loss in the pathophysiology of COVID-19 disease has generated interest among researchers. Various studies have put forth explanations for why olfactory dysfunction occurs in COVID-19 disease, including invasion by the virus into the olfactory system tissues, immune responses, or neurological effects[3,4]. The distinct appearance of this symptom or its early manifestation emphasises its importance, as a sign for diagnosis and forecasting in the field. Studies from around the world have shed light on the link between COVID-19 disease and loss of smell.

Buzgeia et al. found that for longer than two months, loss of smell, among other symptoms, is the most prevalent and enduring symptom in patients in Libya[5]. Given the Libyan population's distinctive genetic, environmental, and sociocultural characteristics, a targeted study of smell losspost-COVID-19 disease is warranted. In the context of COVID-19 patients in Libya, the frequency, duration, and clinical features of olfactory impairment are yet unknown and require further investigation and examination. To the

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best of the researcher's knowledge, no study has been done in Libya to investigate the recovery of the loss of smell post-COVID-19. Thus, the main objective of this research is to examine the recovery process and the demographics that influence patients in Benghazi, Libya, who have lost their sense of smell after getting COVID-19 disease, as well as the course of smell recovery. Additionally, to investigate if there are statistically significant differences in the respondents' answers based on age, gender, and the extent of smell loss.

2. MATERIAL AND METHODS

This research adopts a cross-sectional design to capture a snapshot of patient experiences during the COVID-19 pandemic in Libya. A questionnaire with three sections is used for data collection. These sections are (1) demographic characteristics of the participants; (2) clinical characteristics related to COVID-19 disease for the participants; and (3) a five-point Likert scale for six questions, where 1 is for “strongly disagree” and 5 is for “strongly disagree.” Data was exclusively collected from participants diagnosed with COVID-19 disease, who lost their sense of smell, whether they recovered from it or not.

The structured questionnaire is administered to participants, ensuring informed consent and anonymity. This research adheres to ethical guidelines, which include maintaining confidentiality, ensuring voluntary participation, and obtaining informed consent from participants. The questionnaire was distributed from November 2023 to February 2024 at (1) the Speciality Surgical Center, which is a government teaching centre for Urology and ENT in Benghazi; and (2) the Al-Rowad Specialized Center, which is a private centre in Benghazi for ENT and speech therapy. This research received the approval to distribute the questionnaire from the two centres. The researcher received 113 questionnaires, 17 of them were excluded because of incomplete data. Thus, the data from 96 questionnaires was entered into the Statistical Package for Social Sciences (IBM SPSS 25) program for scanning and purification before the analysis was conducted.

After introducing the demographic and clinical characteristics of the participants, this researcher employed Cronbach's alpha test to examine the reliability of the responses as well as the Kolmogorov-Smirnov test to investigate the normality of the respondent answers. Then, the descriptive analysis was conducted by using the minimum, maximum, mean, median, and standard deviation of the answer’s value. After the descriptive analysis is done, the nonparametric tests are conducted. In detail, the researcher applied the One-sample Wilcoxon Signed rank test to determine if there is a significant difference between the median of the answers in the Likert-scale score and a hypothesised median value (which is equal to 3). Besides, this research applied the Spearman correlation test to investigate the relationship between the severity of the smell loss and the recovery period. Finally, the Independent Samples Kruskal-Wallis test is applied to investigate whether there are statistically significant differences in respondents based on various factors, such as smell loss severity, gender, and age. The significant level of the tests above is at 0.05.

3. RESULTS

The results in Table 1 below show that the total number of participants in the study was 96; sixty-three (66%) were females and thirty-three (34%) were males. In terms of age, the majority are between 20 and 60 years old (86%), but the highest percentage remains between the ages of 40 and 60. Any participant aged less than 18 is excluded. Besides, only 8 (8%) participants are smokers, compared to 88 (92%) who are not. Regarding chronic diseases, more than half of the participants had chronic diseases (59%); the most common diseases are chronic sinusitis and allergic rhinitis, however, 41% of the participants have no medical history.

Since this research relies heavily on data that may last up to four years, participants in the study may not be accurately aware of the severity of infection with COVID-19 disease, especially since it was a new disease at the time. Thus, the severity of the infection in this research was characterised as follows: (1) participants who had home treatment are considered to have a mild disease; (2) participants who were treated at an outpatient department are considered to have a moderate disease, and (3) participants who were admitted to the hospital are considered to have a severe disease. It is worth noting that any participants admitted to the ICU are excluded since they might be unreliable. Thus, the results in the table indicate that 22 (23%) of the participants had a mild disease. 41 (43%) had a moderate disease and 33 (34%) had a severe disease. Thus, most of the participants had a moderate COVID-19 disease. Concerning the severity of the loss of smell, it was found that 16 (17%) participants suffered from a mild loss of smell, 30 (31%) participants suffered a moderate loss of smell, and 50 (52%) participants suffered a severe loss of smell. Also, the participants of the questionnaire answered the question about whether the onset of smell loss was sudden or gradual, 26 (27%) participants reported that it was a gradual onset while 70 (73%) reported the opposite. The table also indicates that 54 (56%) participants had complete recovery of loss of smell, while 18 (19%) had partial recovery, and 24 (25%) had no recovery. Lastly, there is a general trend in the responses that they are against considering loss of smell as an early indicator of infection with COVID-19 disease. The number of non-agrees reached 49 (51%) participants vs. 21 (22%) who agreed, while the other 26 (27%) partially agreed

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Table1. Demographic and Clinical Characteristics of the Participants

Participants Demographic Characteristics		No.	(%)
Gender			
	Male	33	34%
	Female	63	66%
Age			
	More than 60 years	3	3%
	More than 40 and less than 60 years	44	46%
	Between 20 and 40 years	38	40%
	Less than 20 years	11	11%
Smoking			
	Yes	8	8%
	No	88	92%
Chronic Diseases			
	Chronic sinusitis	12	13%
	Hypertension	4	4%
	Hypertension, Diabetes	2	2%
	Hypertension, Chronic sinusitis	2	2%
	Diabetes	3	3%
	Allergic rhinitis	12	13%
	Allergic rhinitis, Chronic sinusitis	11	11%
	Allergic rhinitis, Hypertension	2	2%
	Allergic rhinitis, Hypertension, Chronic sinusitis	2	2%
	Others	7	7%
	No medical history	39	41%
Participants Clinical Characteristics		No.	(%)
COVID-19 severity			
	Mild (Home Treatment)	22	23%
	Moderate (Out-patient)	41	43%
	Severe (Hospital Admission)	33	34%
Severity of Smell Loss:			
	Mild	16	17%
	Moderate	30	31%
	Severe	50	52%
Smell loss was:			
	Gradually	26	27%
	Suddenly	70	73%
Recovery of smell loss:			
	Yes	54	56%
	Partially	18	19%
	No	24	25%
Loss of smell as an indicator of infection with COVID-19 disease?			
	Agree	21	22%
	Partially	26	27%
	Disagree	49	51%

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Figure 1 below illustrates the recovery period for the 54 participants who have completely recovered from the loss of smell. The results indicate that the day's range for recovery was between 2 and 70 days, with a mean of 24.3 days and a median of 14.5 days. It is also noted that the majority of the participants recovered on the 7th, 14th, and 30th days, with 14 participants, 8 participants, and 9 participants, respectively. Hence, there was a noticeable improvement in the recovery from loss of smell in the first 14 days after the diagnosis. In the first month, 46 out of 54 participants completely recovered, and only 8 participants recovered after 60 days.

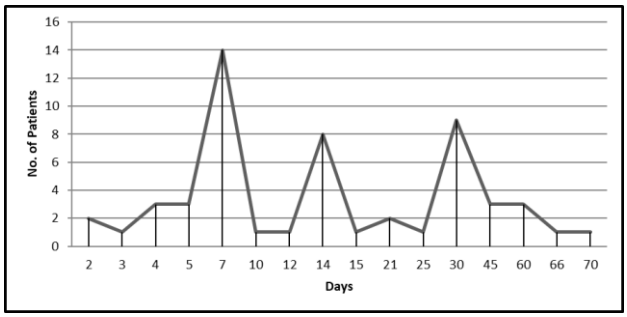

Fig. 1. Recovery Period of Smell Loss

Furthermore, to ensure that participants do not lose interest in their answers, this research also applied the 5-Likert scale. Table 2 below presents the six questions and the total answers of the 96 participants. The results of the table indicate that in question 1, 57 (59%) participants either did not experience runny noses during COVID-19 disease or only had mild symptoms. On the other hand, only 7 (7%) participants had a severe to very severe runny nose. In the same vein in question 2, 47 (49%) participants either had no or very mild nasal congestion during COVID-19 disease, while more than half of the participants 49 (51%) had between moderate and severe congestion (28, 21 participants, respectively). For the change of sense of smell for regular odours during COVID-19 disease in question 3, the responses were close where 41 (43%) participants had no change or had minimal change whereas 35 (36%) participants had severe change. After recovery from COVID-19 disease, 25 (26%) participants had a strong sense of smell, 29 (30%) participants had a moderate sense of smell and 42 (44%) participants had a weak sense of smell. Upon the return of sense of smell in question 5, 66 (69%) participants still could not distinguish some smells while 30 (31%) participants did not suffer from this issue. Lastly, in question 6 regarding whether the use of the loss of smell as an early indicator of infection with COVID-19 disease, most of the participants either disagreed or slightly agreed (49 participants) compared with 21 participants who agreed and strongly agreed.

Table 2. Total Answers of the 96 Participants for the 5-Likert Scale

No.	Questions	1 (Strongly Disagree)	2	3	4	5 (Strongly Agree)
Q1	Did you experience a runny nose during your COVID-19 disease?	40	17	32	5	2
Q2	Did you suffer from nasal congestion during your COVID-19 disease?	28	19	28	17	4
Q3	Did you notice a change in your sense of smell for regular odours during your COVID-19 disease?	26	15	20	24	11
Q4	Was your sense of smell back to normal after recovery from COVID-19 disease?	24	18	29	20	5
Q5	Upon the return of your sense of smell, are there still some smells you cannot distinguish?"	17	13	24	20	22
Q6	Do you think that losing the sense of smell may be used as an early indicator of infection with COVID-19 disease?	31	18	26	13	8

To test the reliability of the responses on the 5-Likert scale, this study employs Cronbach's alpha test. The results show that the alpha value of this research is equal to 0.645. If the alpha value is between 0.64 and 0.85, the questionnaire respondents are considered adequate[6]. Thus, the results of this research are satisfactory. Furthermore, to examine whether the answers to the 5-Likert scale are normally distributed or not, this research applies the Kolmogorov-Smirnov test. The results of the Kolmogorov-Smirnov test are presented in Table 3. The result of the table indicates that all answers for the 96 participants on the 5-Likert scale are not normally distributed.

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Table 3. Normally Distributed Test Results

No.	Questions	Statistic	df.	Sig.
1	Did you experience a runny nose during your COVID-19 disease?	0.260	96	0.00*
2	Did you suffer from nasal congestion during your COVID-19 disease?	0.182	96	0.00*
3	Did you notice a change in your sense of smell for regular odours during your COVID-19 disease?	0.175	96	0.00*
4	Was your sense of smell back to normal after recovery from COVID-19 disease?	0.184	96	0.00*
5	Upon the return of your sense of smell, are there still some smells you cannot distinguish?	0.159	96	0.00*
6	Do you think that losing the sense of smell may be used as an early indicator of infection with COVID-19 disease?	0.194	96	0.00*

*** Significant at a level of 0.05**

Since the answers are not normally distributed, this research applies the non-parametric test, namely the One-Sample Wilcoxon Signed Rank and Independent Samples Kruskal-Wallis tests. The results of the descriptive analysis as well as the One Sample Wilcoxon Signed Rank of the respondents are presented in Table 4. The range of answers to all questions is between 1 (min) and 5 (max), and the standard deviation is between 1.073 and 1.386. The median value in the first two questions is equal to 2 (mean=2.08) and 3 (mean=2.48), respectively, with a p-value equal to 0.00. Thus, the participants significantly disagree that they experience a runny nose during the COVID-19 disease, while their opinion about whether they suffer from nasal congestion during your COVID-19 disease is significantly neutral. The responses of the participants are also neutral regarding whether they noticed a change in their sense of smell for regular odours during their COVID-19 disease, but statistically insignificant (p-value=0.065). Thus, there is no difference between the median of the answers and the hypothesised median value of 3.

After recovery from COVID-19 disease, as the median is equal to 3, the strength of the sense of smell is significantly neutral(p-value=0.002). However, some participants regained their sense of smell as normal as it was before having the disease, and others reported that their sense of smell was not as normal as before the disease. Yet, according to the answers to question 5, the results are statistically significant (p-value=0.00) that they could distinguish between different odours upon returning their sense of smell. After asking the participants whether losing the sense of smell may be used as an early indicator of infection with COVID-19 disease, the responses significantly disagreed (p-value=0.00). It is worth noting that this question (No. 6) was also asked in this research among the questions related to COVID-19 disease (section 2).

Table 4. Descriptive Analysis

No.	Questions	Min	Max	Std. Deviation	Mean	Median	P-value (5%)
1	Did you experience a runny nose during your COVID-19 disease?	1	5	1.073	2.08	2	0.00*
2	Did you suffer from nasal congestion during your COVID-19 disease?	1	5	1.205	2.48	3	0.00*
3	Did you notice a change in your sense of smell for regular odours during your COVID-19 disease?	1	5	1.386	2.78	3	0.065
4	Was your sense of smell back to normal after recovery from COVID-19 disease?	1	5	1.216	2.63	3	0.002*
5	Upon the return of your sense of smell, are there still some smells you cannot distinguish?	1	5	1.172	1.88	1	0.00*
6	Do you think that losing the sense of smell may be used as an early indicator of infection with COVID-19 disease?	1	5	1.294	2.45	2	0.00*

***Significant at a level of 0.05**

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This research also investigates the relationship between the smell loss severity and the period of the smell loss recovery. It is evident from the results in Table 5 that there is a statistically significant relationship between the severity of the smell loss and the period of the smell loss recovery (p-value=0.008). The correlation is considered weak if the value falls between 0.20 and 0.39[7], and hence, the relationship between the smell loss severity and the period of the smell loss recovery is weak, as the value coefficient is equal to 0.356.

Table 5. Relationship between the Smell Loss Severity and Smell Loss Recovery Period

Spearman Correlation Test		Smell Loss Severity	Smell Loss Recovery Period
Smell loss severity	Correlation Coefficient	1.000	0.356*
	Sig. (2-tailed)	.	0.008

***Significant at the 0.05 level (2-tailed).**

The results of whether there are differences in the answers related to smell loss severityon the one hand and between gender, smell lossrecovery patterns, andsmell lossrecovery period on the other hand are shown, respectively, in Panels (a) through (c) in Table 6.It is evident from the results in the table that there are no statistically significant differences in the median between groups of varying smell loss severity (mild, moderate, or severe) in different genders, and smell recovery periods (all p-values> 0.05). Concerning the smell loss severity and the recovery patterns, the result in the table demonstrates that there are significant differences between the group of varying smell loss severity (mild, moderate, severe) and the recovery patterns (p-value=0.011). It also shows that the complete recovery of the smell loss is more frequent in participants with moderate and severe loss than in participants with mild smell loss.

Table 6. Differences in Smell Loss Severity According to Various Factors

Panel (a) Smell Loss Severity and Gender

Smell Loss Severity	Total Number *n* (%)	Males *n* (%)	Females *n* (%)	P-value
Mild	16 (17%)	4 (4%)	12 (13%)	0.569
Moderate	30 (31%)	11 (11%)	19 (20%)	
Severe	50 (52%)	18 (19%)	32 (33%)	

Panel (b) Smell Loss Severity and Recovery Patterns

Smell Loss Severity	Total Number n (%)	Complete Recovery n (%)	Partial or No Recovery n (%)	P-value
Mild	16 (17%)	4 (4%)	12 (13%)	0.011*
Moderate	30 (31%)	17 (18%)	13 (14%)	
Severe	50 (52%)	28 (29%)	22 (23%)	

***Significant at a 0.05 level.**

Panel (c) Smell Loss Severity and Recovery Period

Smell Loss Severity	Total Number n (%)	Recovery Period	P-value
Mild	16 (17%)	Range (2-7 Days) Mean=5.4, Median = 7, Std. =2.3	0.587
Moderate	30 (31%)	Range (3-45 Days) Mean=15.6, Median = 14, Std. =11.7	
Severe	50 (52%)	Range (2-70 Days) Mean=24.8, Median = 14.5, Std. =20.5	

The results of whether there are statistically significant differences in the answers related to gender on the one hand and the smell recovery patterns and the recovery period, on the other hand, are presented in Table 7. In terms of smell loss recovery, the results in the table indicate that there is a statistically significant difference between males and females (p-value=0.031). The complete recovery in males is higher than in females, where 24 male participants out of 33 participants completely recovered from smell loss, while in females it was only 30 participants out of 63. However, when considering the smell loss recovery period, the differences between males and females are not significant (p-value = 0.031).

Table 7. Smell Loss Recovery and Recovery Period according to Gender

Panel (a) Smell Loss Recovery and Gender

Gander	Total Number *n* (%)	Complete Recovery *n* (%)	Partial or No Recovery *n* (%)	P-value
Male	33 (34%)	24 (25%)	9 (9%)	0.031
Female	63 (66%)	30 (31%)	33 (35%)	

Panel (b) Smell Loss Recovery Period and Gender

Gander	Total Number *n* (%)	Recovery Period	P-value
Male	33 (34%)	Range (2-60 Days) Mean=17, Median = 12, Std. =16	0.713
Female	63 (66%)	Range (2-70 Days) Mean=22, Median = 14, Std. =20	

Lastly, the results of whether there are statistically significant differences in the answers related to age on the one hand and the severity of the smell loss, the smell loss recoverypatterns, and the smell loss recovery period, on the other hand, are presented in Table 8. The results show that there is no statistical difference between the age of the participants on the one hand and the severity of smell loss and the recovery pattern, on the other hand. In contrast, there is a significant difference between the age and the recovery period (p-value=0.008). Participants aged between 20 and 40 years old took a longer time for their smell recovery, contrary to the participants of other ages.

Table8. Smell Loss Severity, Recovery Patterns and Recovery Period according to Age

Panel (a) Age and Smell Loss severity.

Age	Total Number *n* (%)	Mild Smell Loss *n* (%)	Moderate Smell Loss *n* (%)	Severe Smell Loss *n* (%)	P-value
More than 60	3 (%)	2 (2%)	0 (0%)	1 (1%)	0.074
More than 40 and less than 60	44 (46%)	8 (8%)	16 (17%)	20 (21%)	
Between 20 and 40	38 (40%)	6 (6%)	14 (15%)	18 (19%)	
Less than 20	11 (11%)	4 (4%)	5 (5%)	2 (2%)	

Panel (b) Age and Recovery Patterns.

Age	Total Number *n* (%)	Complete Recovery *n* (%)	Partial or No Recovery *n* (%)	P-value
More than 60	3 (3%)	1 (1%)	2 (2%)	0.197
More than 40 and less than 60	44 (46%)	18 (19%)	26 (27%)	
Between 20 and 40	38 (40%)	28 (29%)	10 (11%)	
Less than 20	11 (11%)	7 (7%)	4 (4%)	

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Panel (c) Age and Recovery Period.

Age	Total Number *n* (%)	Recovery Period	P-value
More than 60	3 (3%)	Range (5-45 Days) Mean=26, Median = 7, Std. =18.40	0.008*
More than 40 and less than 60	44 (46%)	Range (2-70 Days) Mean=15.3, Median = 7, Std. =16.37	
Between 20 and 40	38 (40%)	Range (7-60 Days) Mean=26.6, Median = 21, Std. =18.50	
Less than 20	11 (11%)	Range (2-45 Days) Mean=19, Median = 15, Std. =16	

***Significant at a 0.05 level**

It is worth mentioning that the number of smoker participants is relatively small in this research, as it only represents 8 out of 96 participants. This might be because the majority of participants in the questionnaire are females, and smoking is considered unfashionable among them in Benghazi. Thus, no analysis is conducted to compare the smell loss between smoker participants and non-smoker participants.

4. DISCUSSION

A unique and interesting aspect of the COVID-19 pandemic, which is brought on by the new coronavirus SARS-CoV-2, is anosmia, or the loss of smell. Therefore, this research's primary objective is to provide an in-depth understanding of the recovery process and the demographic factors that affect patients with loss of smell post-COVID-19 disease in Benghazi, Libya. Also, to examine respondents' responses differ statistically significantly according to several variables, including gender, age, and the degree of smell loss. In this cohort, the total number of participants was 96, of which 63 were females and 33 were males. The majority of participants were between the ages of 40 and 60 years old, and the minority were found to be older than 60 years old. More than 40% of the participants have no medical history. Regarding other symptoms associated with COVID-19 disease, more than half of the participants 49(51%), had between moderate to severe nasal congestion during their disease this was the same result as shown in another study[8].

The severe loss smell was only reported in 17.3% of participants in the Hopkins et al. study[9], while in this study it is reported in 52% of participants. Furthermore, 54 (56%) participants stated that they had completely recovered from the smell loss. Thus, contrary to what Amer et al[10] found, this research found that the majority of participants completely recovered from smell loss. These results are in line with the results of several studies[11,12,13]. The median day of the recovery of smell loss in this research was 14.5 days, which is less than the median of a study in Saudi Arabia, which is 21.76 days[8]. However, the median day of recovery in another study is 7 days[19]. Similar to other studies conducted in other countries[14,15], this research found that most of the participants completely regained their sense of smell in one month. Another study found that the majority of participants recovered from smell loss in 3 weeks[19]. Results of other studies asserted that within the first 2 weeks, a substantial improvement in smell loss had occurred[16].

Unlike AlYahya et al. who found that only 45% of patients reported a sudden loss of smell, this research found that the majority (73%) of participants lost their smell suddenly[8], and this result is supported by other research[14,10,17,9]. Generally speaking, anosmia is the first or only symptom in asymptomatic COVID-19 carriers. In this context, many studies concluded that the loss of smell should be considered an early indicator of COVID-19 disease[17, 18,19]. Nevertheless, this study found that only 21 (22%) participants completely agreed, 26 (27%) participants partially agreed, and 49 (51%) not agreed. When testing their answers in the One-Sample Wilcoxon Signed Rank test, the results were significantly disagreed (p-value=0.000). Indeed, Trani notes a claim by Professor Evan Reiter, a professor in the Otolaryngology Department at the VCU School of Medicine in the USA, that loss of smell is no longer used as an indicator for infection with COVID-19[20].

Another study concluded that there is a positive relationship between smell loss severity and the recovery period[11]. It makes sense that the degree of smell loss was linked to a longer recovery time since it could indicate more serious harm to the olfactory structures. This relationship, however, is considered significantly weak in this research since the correlation coefficient was 0.356.

Vaira et al. concluded that there are no differences between males and females concerning smell loss[21].This research found insignificant differences in the recovery period between males and females (p-value=0.713). However, different studies asserted that the loss of smell was a symptom that affected women more often[1,19,22,23]. Amer et al. emphasised that females need more recovery time than males[10]. Shahzad and Jamilconcluded that there

is no difference in a complete recovery between females and males[24].

In terms of smell loss and age, Lechien et al. found that the loss of smell sense was greater in younger patients[22]. This is in line with Lee et al. argument, who found that younger people demonstrated a propensity to endure smell loss for a longer period, especially those between the ages of 20 and 39 years old[19]. On the other hand, according to Vaira et al, the smell loss was more severe in patients who were older than 50 years old[21]. However, in this research, the results indicate there is no statistical difference between the age of the participants and the recovery pattern, however, participants between 20 and 40 years old took a longer time for their smell recovery, contrary to the participants aged more than 40 years old (P-value=0.008).

5. CONCLUSION

In the end, it can be concluded that, although the infection with COVID-19 among the participants was generally of moderate severity, the condition of the loss of the olfactory sense was severe and occurred suddenly, but at the same time, the largest percentage of participants recovered completely from it within the first two weeks of infection. However, it cannot be relied on smell loss as an early indicator of COVID-19 infection.

Limitation of the Research

Although the researcher made every effort to reduce the limitations of this research to a minimum, there are some of them that the research may have fallen into one or more. These limitations are as follows:

- Sample Size: The study's sample size might be limited since it only focuses on patients from Benghazi. As such, the results cannot be applied to the whole Libyan population.
- Self-Reporting Bias: Since the questionnaire relies on patients' self-reports, there is a chance that there will be bias or inaccuracies because of memory recall or subjective interpretations.
- The sample's representativeness may be impacted by the systematic differences between those who choose to participate and those who do not.
- The questionnaire might have missed some crucial elements that could have had an impact on the results, as it may not have included every relevant variable of scent loss and recovery.

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